# ACADEMIC RESEARCH ON CATTLE'S ACCLIMATISATION PROCESS

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## ABSTRACT

Animal's welfare and performance is compromised by environmental heat stress, present during summer in the Mediterranean climate. Heat stress effects are well known and widely studied, although the mechanisms of season acclimatisation are less well understood. Throughout the last 20 years, we have been studying this process in the Mediterranean and tropical regions, aiming to understand it better, developing and improving methodologies and search for reliable biomarkers of thermal stress.

The climatic changes, the more frequent extreme events and the increase of ambient temperature at the surface of the earth were identified as a problem to the animals in general and particularly under production systems conditions. Then, the main question is how those factors can affect the farm animals, especially those with higher genetic merit for production and lack of environmental adaptation. With these premises, were developed research projects on cattle's acclimatisation process. These projects outcomes were: 2 PhD thesis and 5 Master dissertations, alongside ten articles peer-review and index journals and 20 publications in the book of abstracts and also several communications in national and international symposiums.

Keywords: acclimatisation; heat stress; cattle.

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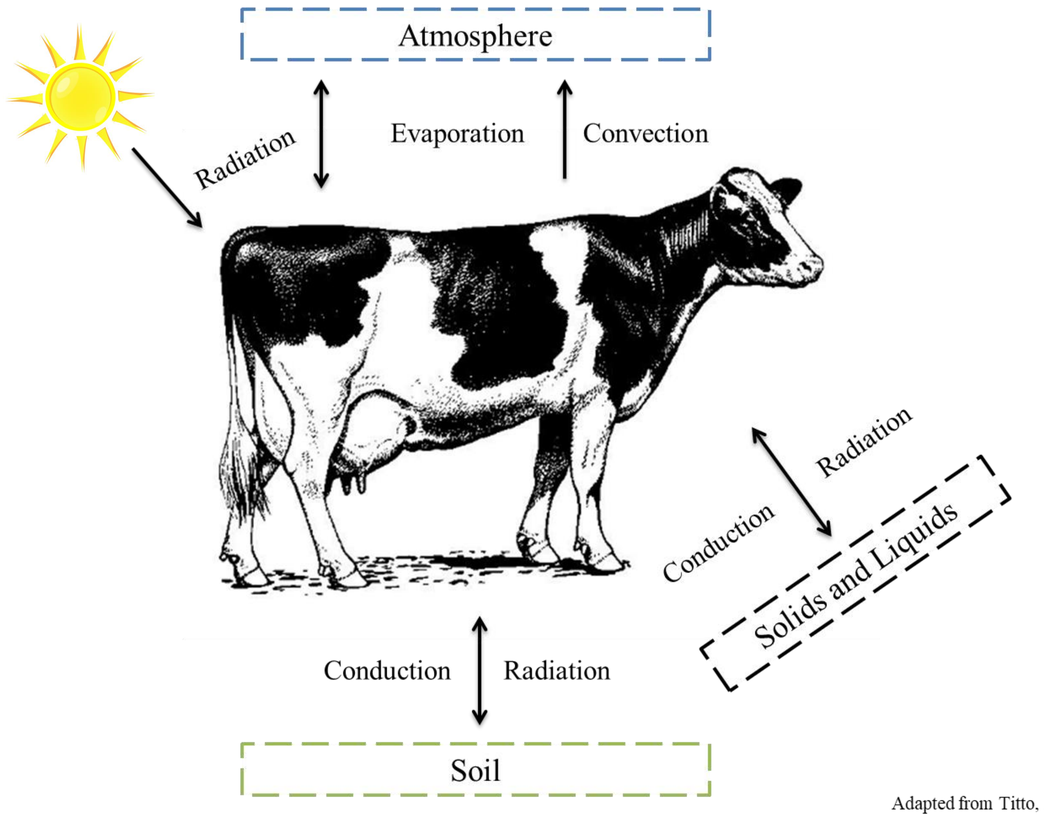
## Background




Adapted from Titto, 1998

Acclimatisation

- Thermogenesis decreased
- Latent thermolysis increased
- HSP expression increased
- Skin and hair adaptation
- Behavioural changes

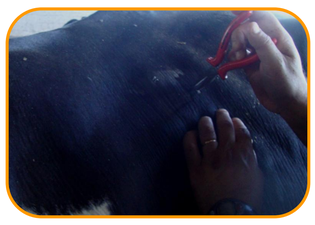
## Objectives

To study the mechanisms of season acclimatization, in the Mediterranean and tropical regions, to better understand it, developing and **improving methodologies** and search for **reliable biomarkers** of thermal stress.

## Some methodologies approached

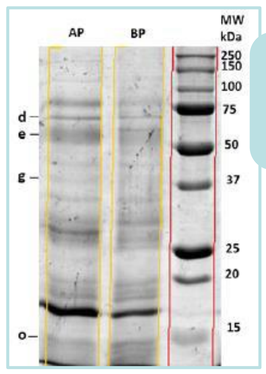
Rectal temperature measurement

Collecting blood samples for hemogram and hormonal analysis



Collecting hair samples to access seasonal morphological changes

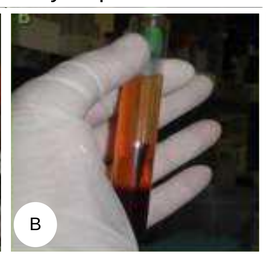
Collecting saliva for HSP expression detection



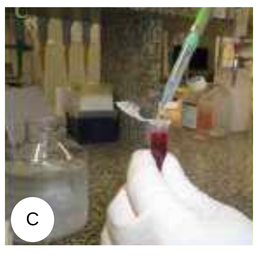

**SDS-Page** bands showing differences in saliva protein expression of cows with different genetic merit for milk production

Red Blood Cell lysis protocol for HSP expression analysis :

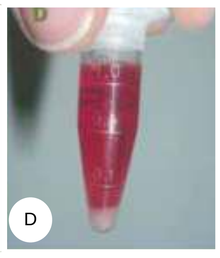

Blood samples after centrifugation




Removing buffy coat

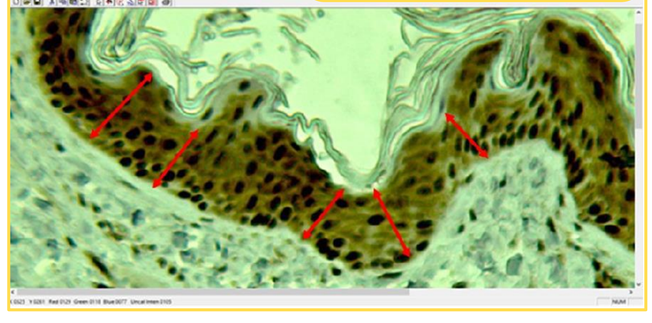



Adding the lysis buffer




Lymphocytes pellet

Using image software to analyse morphophysiological variations in epidermal tissue samples



## Outcomes

Since the results obtained, over the year, are to vast to be all represented, we let you know some of our academic works:

**PhD**

- Alfredo Pereira (2004). Adaptação ao ambiente geofísico mediterrânico de bovinos nativos e exóticos - tolerância ao calor. Universidade de Évora
- Ana Geraldo (2013). Thermotolerance in cows: cellular and physiological approaches, Universidade de São Paulo

**Msc**

- Flávio Silva (2015). Anatomic and physiologic variations of seasonal acclimatization – study in dairy cows with different milk yield potential. Universidade de Évora
- Liliana Cachucho (2015). Salivary biomarkers of acclimatization – study in dairy cows with different milk yield potential. Universidade de Évora
- Catarina Matos (2015). Sweat Glands Histophysiology In Dairy Cows Face To Seasonal Acclimation. Universidade de Évora

ICEAS International Congress of Education in Animal Sciences

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